

WHAT IS CLAIMED IS:

1. A reflective grating for precision location measurement, the reflective grating comprising:
 - a non-reflective substrate layer;
 - an non-reflective adhesion layer disposed on the substrate layer;
 - a reflective surface layer disposed on the adhesion layer; and
 - a series of grating lines formed in the reflective surface layer by removing portions of the reflective surface layer to expose the non-reflective adhesion layer.
2. A reflective grating as recited in claim 1 wherein the grating lines are formed by removing portions of the reflective surface layer and the non-reflective adhesion layer.
3. A reflective grating as recited in claim 1 wherein the non-reflective substrate is a material with a low coefficient of thermal expansion.
4. A reflective grating as recited in claim 3 wherein the non-reflective substrate is selected from Invar and Super Invar.
5. A reflective grating as recited in claim 1 wherein the non-reflective substrate is Invar, the non-reflective adhesion layer is nickel, and the reflective surface layer is gold.
6. A reflective grating as recited in claim 1 wherein the grating lines are formed by vaporizing the reflective surface layer with a laser.

7. A reflective grating as recited in claim 1 wherein the grating lines are formed by vaporizing the reflective surface layer and the non-reflective adhesion layer with a laser.

8. A reflective grating as recited in claim 1 further comprising a contact adhesive layer disposed on a side of the substrate opposite the adhesion layer.

9. A reflective grating as recited in claim 1 wherein the reflective surface layer is a photo-imagable layer and the series of grating lines are formed in the reflective surface layer by selectively exposing portions of the photo-imagable layer.

10. A reflective grating as recited in claim 1 wherein the grating lines are formed by melting the reflective surface layer with the laser.

11. A reflective grating as recited in claim 1 wherein the grating lines are written onto polished monolithic substrates.

12. A reflecting grating as recited in claim 1 wherein the grating lines are written onto a polished surface on a linear or rotary translator.

13. A reflective grating as recited in claim 1 wherein the grating lines are written onto a polished surface on the bearing element of a linear or rotary translator.

14. A reflective grating as recited in claim 1 wherein the grating lines are written onto a polished surface on the mounting platform of a linear or rotary translator.

15. A method of forming a reflective grating from a tape having a non-reflective substrate layer, a non-reflective adhesion layer, and a reflective surface layer with a laser, the method comprising defining grating lines in the reflective surface layer by vaporizing the reflective surface layer with the laser.

16. A method of forming a reflective grating as recited in claim 15 whereby the substrate is Invar, the adhesion layer is nickel, and the surface layer is gold.

17. A method of forming a reflective grating as recited in claim 15 wherein the non-reflective substrate is a material with a low coefficient of thermal expansion.

18. A method of forming a reflective grating as recited in claim 17 wherein the non-reflective substrate is selected from Invar and Super Invar.

19. A method of forming a reflective grating as recited in claim 15 further comprising vaporizing the surface layer and the adhesion layer in order to define the grating lines.

20. A method of forming a reflective grating as recited in claim 15 further comprising adhering a contact adhesive layer to a side of the substrate opposite the adhesion layer.

21. A method of forming a reflective grating as recited in claim 15 wherein the reflective surface layer is a photo-imagable layer and the grating lines are formed in the reflective surface layer by selectively exposing portions of the photo-imagable layer with the laser.

22. A method of forming a reflective grating as recited in claim 15 wherein the grating lines are formed in the reflective surface layer by melting selected portions of the reflective surface layer with the laser.

23. A system for forming a reflective grating from a tape having a substrate, an adhesion layer, and a surface layer, the system comprising:
a feed roll having the tape rolled thereon;
a drive roller for retrieving the tape from the feed roll;
a laser for writing grating lines onto the tape by vaporizing portions of the surface layer to expose the adhesion layer; and
a take-up reel for rolling the tape into a roll after being vaporized by the laser.

24. A system for forming a reflective grating as recited in claim 23 further comprising a read head for verifying that the laser station vaporizes the surface layer.

25. A system for forming a reflective grating as recited in claim 23 further comprising a contact adhesive feed roll for applying a contact adhesive to the substrate.

26. A system for forming a reflective grating as recited in claim 23 wherein the laser is a high-frequency pulsed laser that vaporizes the surface layer.
27. A system for forming a reflective grating as recited in claim 23 wherein the laser also vaporizes the adhesion layer.
28. A system for forming a reflective grating as recited in claim 23 wherein the laser melts the portions of the surface layer to expose the adhesion layer.
29. A system for forming a reflective grating as recited in claim 23 wherein the reflective surface layer is a photo-imagable layer and the grating lines are formed in the surface layer by selectively exposing portions of the photo-imagable layer with the laser.